REVIEWS

Two Gas Collections from Mauna Loa. By E. S. SHEPHERD. *Bull. Hawaiian Observatory*, Vol. XIII, No. 5, May, 1920.

This is a brief report by Dr. Shepherd of the Carnegie Geophysical Laboratory at Washington on two gas samples collected by Dr. T. A. Jaggar, Jr. The samples were taken near the edge of a flow of incandescent rough pohoehoe lava on the south slope of Mauna Loa. The gases were collected in vacuum tubes from a depth of 2 feet in a 2-inch crack in the lava surface. The lava at a depth of 3 feet was glowing and the estimated temperature at the point of collection was 300° C.

A condensation of water within the tube was noted immediately upon collection. The analyses showed that about 70 per cent by volume of the gas (computed at 1200° C. and 760 mm. pressure) was water, in which respect the gases closely resemble those of Kilauea. About 16 per cent was nitrogen and the remainder mainly SO_3, SO_2 and CO_2. The water cannot be explained as the result of oxidation of hydrogen by admixed air, as is shown by the nitrogen percentage. If all the nitrogen were assumed to come from admixed air, the oxygen in such a quantity of air would be insufficient to account for the observed water.

The evidence of these samples accords with the classic work of Day and Shepherd at Kilauea in demonstrating the abundant presence of water in certain volcanic gases.

The gases of Mauna Loa show a high degree of oxidation, i.e., they have been almost completely burned. In general, they show a high degree of similarity to the Kilauea gases although the latter are rather variable. Especially noteworthy at Mauna Loa is the abundance of SO_3—2 to 8 per cent.

E. S. BASTIN

The Geology and Ore Deposits of the Virgilina District of Virginia and North Carolina. By FRANCIS BAKER LANEY. Virginia Geological Survey, University of Virginia. (Prepared jointly by the Virginia Geological Survey and the North Carolina Geological and Economic Survey.) 1917. Pp. 176.

The Virgilina district which lies partly in Virginia and partly in North Carolina is one of the copper districts in the eastern United States

that has produced considerable tonnages of ore. The investigation covers an area of approximately 550 square miles, including parts of Charlotte, Halifax, and Mecklenburg counties, Virginia, and parts of Granville and Person counties, North Carolina.

The area is made up almost wholly of igneous and highly metamorphosed rocks. They include ancient metamorphic gneisses and schists, the origin of which is unknown; a sequence of volcanic rocks, both basic and acidic, and volcanic clastics of each type, together with much volcano-sedimentary material; intrusive rocks of both basic and acid types, such as gabbro, diorite, granite, and syenite; and different varieties of dike rock, especially diabase. There is a small area of red or brown sandstone of Triassic-Newark age. Except the intrusives, the sandstones, and the dikes the rocks are all highly schistose and gneissoid in texture.

This prominent schistosity of the rocks is probably the most obvious structural phenomenon of the district, although jointing is prominent and there is conclusive evidence of folding. There is little direct evidence of faulting, but the intense dynamic metamorphism of the district could hardly have occurred without causing a certain degree of faulting.

With the exception of a few mineralized areas in more or less epidotized zones of the true basic schist, where deposits of native copper or of cuprite occur, the ore deposits are found in well-defined fissure veins, which occupy fractures in the rocks—in some instances possibly fault planes. The rock in which the veins occur is basic in character—the Virgilina greenstone—having the mineralogical and chemical nature of andesite; but it is thought that the vein material, both ore and gangue, was derived from the granitic magma of the region.

The gangue minerals, exclusive of included fragments of schist, named in the approximate order of their abundance, are: quartz, calcite, epidote, chlorite, hematite, sericite, albite, and possibly other plagioclase feldspars in small amount, and pink orthoclase.

The ore minerals, named in the approximate order of their abundance are: bornite, chalcocite, native copper, malachite, azurite, cuprite, chalcopyrite, chrysocolla, klaprothite (?), pyrite, argentite, silver, and gold. Of these minerals, bornite (in part), chalcocite (in part), chalcopyrite (in part), pyrite, klaprothite, argentite, native copper, and gold are regarded as hypogene or primary; while a part of the chalcocite, bornite, and chalcopyrite, and all the native silver, cuprite, malachite, azurite, and chrysocolla are held to be supergene or secondary.

The author gives a description of individual mines and prospects. A good geologic map of the district is appended to the report.

R. A. J.

The Stratigraphy and Correlation of the Devonian of Western Tennessee. By CARL O. DUNBAR. State of Tennessee, State Geological Survey, Bull. No. 21, Nashville, Tenn., 1919.

This volume is a detailed statement of the stratigraphy and correlation of the Devonian rocks of the western valley of the Tennessee River. The long sequence of the Devonian strata exposed in this region, especially the presence of the Upper Oriskany, and the abundance of fossils, probably will make this the standard section of the Lower Devonian of the entire Mississippi Basin. The important paleontological aspects of the problem are well treated. Following is the sequence of the Devonian formations of western Tennessee, as given by the author:

Series	Group	Formation
Neo-devonian	Chautauquan	Chattanooga shale Hardin sandstone member
	Senecan	Break
Meso-devonian	Erian	
	Ulsterian	Pegram limestone Break Camden chert
Paleo-devonian	Oriskanian	Break Harriman chert Break Quall limestone
		Break
	Helderbergian or Linden	Decaturville chert Break Birdsong shale Break Olive Hill formation: Flat gap limestone, Bear Branch limestone, Pyburn, Ross limestone Break Rockhouse shale

R. A. J.